IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Grah et al	Examiner:	S. McClendon
Serial No.:	10/725,209	Docket:	D-43583-01
Filed:	December 1, 2003	Art Unit:	1711
Title:	Method of Increasing the Gas Transmission Rate of a Film		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Declaration of Grah and Havens Under Rule 1.132

Our names are Michael D. Grah and Marvin R. Havens. We are the inventors of the above-identified patent application. We are both currently employed by the Research and Development Department of Cryovac, Inc., the owner of the above-identified patent application. We were both employed by Cryovac, Inc. in that Department while making the inventions claimed therein.

U.S. Patent Application Publication 2004/0241482 was filed June 2, 2003 by Michael D. Grah and Kelly R. Ahlgren. The '482 publication is owned by Cryovac, Inc. Kelly Ahlgren is also employed by the Research and Development Department of Cryovac, Inc.

Before the filing date of the '482 publication, Grah and Havens conceived the subject matter disclosed in the '482 publication paragraphs 0014-0017, 0029, 0041-0043, 0051, and 0138 that is directed to the idea of incorporating single-walled carbon nanotube material in one or more layers of a film and subsequently irradiating the film. See the Disclosure of Invention by Michael Grah and Marv Havens entitled "Intelligent packaging film with switchable barrier property" attached as Exhibit I. Each of the dates deleted from Exhibit I is before the June 2, 2003 filing date of the '482 publication.

The subject matter disclosed in the '482 publication paragraphs 0014-0017, 0029, 0041-0043, 0051, and 0138 that is directed to the idea of incorporating single-walled carbon

nanotube material in one or more layers of a film and subsequently irradiating the film is a description of our previous work.

The undersigned Declarants acknowledge that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon. All statements made of the Declarants' own knowledge are true. All statements made on information and belief are believed to be true.

Michael D. Grah

MICHAEL D. GRAH

Date: January 19, 2006

MARVIN R. HAVENS

Date: January 20, 2006

EXHIBIT I

DisclofInvDuncanRev799.dot

CRYOVAC
Sealed Air Corporation

CONFIDENTIAL
DISCLOSURE OF INVENTION
TO
CRYOVAC, INC.
LAW DEPARTMENT

[redacted]

DO NOT WRITE IN THIS SPACE

[redacted]
DATE RECEIVED:
INITIAL: _____

DISCLOSURE NO.
D-43583-00

Title of Invention:
Intelligent packaging film with switchable barrier property

Inventors:
(Printed Full Names) Michael Grah, Marv Havens

I. Summarize the invention in broad terms.

This invention is a packaging film with one or more layers containing a fine dispersion of single walled carbon nanotubes (SWNTs). The nanotubes are of sufficiently small scale that when dispersed sufficiently, optical transparency is maintained. When the film is exposed to intense light, the SWNTs heat up dramatically, and break down the polymer in contact with them. This degradation produces gas, and results in porosity in the barrier layer, greatly increasing the gas transmission rate of the packaging film.

II. Please describe the invention in detail in your own words. Use sketches, graphs, or data as appropriate.

Recently Ajayan et.al. demonstrated that single walled carbon nanotubes ignite when exposed to a photographic flash (Science, V. 296, P. 705, April 26, 2002.) In air, the average light power necessary to ignite the SWNTs was found to be ~100 mW/cm^2. Further, when SWNTs were subjected to a photographic flash in inert atmospheres, extensive structural reconstruction of the SWNTs is observed. This requires that the nanotubes reach a temperature of at least 1500°C. These temperatures are sufficient to vaporize polymer adjacent to the nanotubes.

The object of this invention is a barrier film construction where the barrier layer contains a well dispersed concentration of SWNTs. This film is constructed to possess very good barrier properties. Conventional barrier materials would include EVOH, PVDC, polyamides, polyesters, etc. Concentrations of dispersed SWCNs would likely be low, much less than 10% wt%. Upon controlled exposure to an intense light source, the SWNTs would be instantaneously heated to a temperature sufficient to vaporize the barrier resin adjacent to the dispersed nanotubes. This vaporization would create porosity in the barrier layer, thereby destroying its ability to retard the migration of gases. By controlling the concentration of nanotubes and the intensity and duration of light exposure, the level of heat generation can be tailored to create various levels of permeability increase. Technology exists today to control the application of light energy, such as strobe effects, or the use of lenses and/or reflectors. Under optimized conditions, the permeability of the film can be increased without affecting the transparency of film.

III. How does the invention compare with previous processes, machines, or compositions? What comparative tests were run and what were the results?

No tests have been conducted. The finding by Ajayan et.al. is unprecedented and provides a unique tool that can be used to develop a 'smart' barrier system.

IV. A. Describe the specific problem addressed by the invention and how the invention solves the problem.

Today, applications like case ready and Darfresh require a coextruded barrier film where the barrier is ultimately peeled off when high oxygen permeability is required. This peeling process has inherent disadvantages, such that our customers strongly desire an alternative.

B. What are the advantages of the invention?

This invention would allow us to effectively 'turn off' the barrier properties of a film at any desired point. No peeling of an external layer would be necessary. Further, it would give us the ability to dial in the desired level of permeability (as long as it was higher than that of the barrier resin itself.)

V. It is expected that a prior art search will be conducted prior to submission of this disclosure. Please provide the results of this search and a brief description of the methods used to conduct the search. Indicate what you consider to be the closest prior art and describe how your invention differs. Attach copies of relevant art such as patents, journal articles, advertising brochures, or a description of prior commercial products. (Note: Prior commercial products and processes should be indicated, where appropriate, as prior art.).

A search utilizing Scifinder was conducted. No articles or patents were identified that would qualify as directly relevant prior art. The following articles are tangentally related prior art:

Nanotubes in a Flash – Ignition and Reconstruction. *Ayayan, P.M., et.al., Science (2002), 296, 705. This is the article that stimulated this invention.*

Easy removal of pressure sensitive adhesives for skin applications. *Chivers, R. A. Smith & Nephew Group Research Centre, Heslington, York, UK. Int. J. Adhes. Adhes. (2001), 21(5), 381-388. CODEN: IJAADK ISSN: 0143-7496. Journal written in English. AN 2001:650155 CAPLUS Discusses degradation of adhesive polymers by irradiating the polymer with UV light.*

Investigations into the mechanism of adhesion of a novel light-deactivatable pressure-sensitive adhesive. *Chivers, R. A.; Webster, I. York Science Park, Smith and Nephew Group Research Centre, Heslington, York, UK. Adhesion '99, International Conference on Adhesion and Adhesives, 7th, Cambridge, United Kingdom, Sept. 15-17, 1999 (1999), 37-42. Publisher: IOM Communications Ltd., London, UK CODEN: 69AXE8 Conference written in English. CAN 135:77776 AN 2001:73211 CAPLUS*

Effect of ultraviolet light irradiation on gas permeability in polyimide membranes. 1. Irradiation with low pressure mercury lamp on photosensitive and non-photosensitive membranes. *Matsui, Shigetoshi; Ishiguro, Takayuki; Higuchi, Akon; Nakagawa, Tsutomu. Department of Industrial Chemistry, Meiji University, Kawasaki, Japan. J. Polym. Sci., Part B: Polym. Phys. (1997), 35(14), 2259-2269. CODEN: JPBPEM ISSN: 0887-6266. Journal written in English. CAN 127:279126 AN 1997:627101 CAPLUS Gas permeability reduced by UV light induced crosslinking of the polymer.*

Manufacture of self-cleaning glass, and the glass obtained. *Heller, Adam; Paz, Yaron; Haruvy, Yair. (Heller, Adam, USA; Paz, Yaron; Haruvy, Yair). PCT Int. Appl. (1997), 47 pp. CODEN: PIXXD2 WO 9707069 A1 19970227 Designated States W: AL, AM, AT, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ, DE, DE, DK, DK, EE, EE, ES, FI, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM. Designated States RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT. Patent written in English. Application: WO 96-US12792 19960806. Priority: US 95-2504 19950818. CAN 126:228543 AN 1997:238431 CAPLUS Titania with photocatalysts breaks down dirt and grime on a window surface when struck by light.*

Reversible changes in the permeability of polymers to gases during exposure to g-rays. *Tikhomoirova, N. S.; Malinskii, Yu. M.; Karpov, V. L. Doklady Akad. Nauk S.S.S.R. (1960), 130 1081-4. Journal language unavailable. CAN 56:32036 AN 1962:32036 CAPLUS No abstract available, but energy source is gamma rays, not relevant for activation with visible light.*

VI. Please answer the following:

A. When did you first think of this invention? [redacted]

B. To whom did you first disclose this invention? *This was cooked up in a conversation between the inventors Marv Havens and Mike Grah.*

C. On what date did you make such disclosure? [redacted]

D. When and where did you make the first written description of the invention?

This document

E. When did you first do any actual work toward carrying out the invention?

None yet

F. Is future work on this invention planned?

Yes, I want to experimentally demonstrate the feasibility of this concept. The purpose of this invention record is to document the date of invention.

G. What records do you have to substantiate your answers to questions A-F and the other information provided in this disclosure? (e.g., notebook page numbers, technical reports, monthly reports, technical project authorizations, letters and memos, files, engineering drawings, etc.) - PLEASE ATTACH A COPY.

This document.

H. Are there other Disclosures of Invention submitted to the Patent Department or in preparation that tie in closely with this invention? Give details.

NO

I. Has a machine, product or process based on this invention been offered for sale, sold, used commercially or described in any publication? Yes or No: No

If yes, give dates and to whom: N/A

Is future use or sale planned? *I hope so*

If yes, when and to whom: *We don't know yet*

J. Give dates and details regarding samples, information or publications relating to this invention which have been or will be given to persons outside Cryovac, Inc. Has the invention been discussed with any person other than an employee of Cryovac, Inc.?

No

K. Do any products of this invention contain experimental resins or involve the use of equipment which may be covered by secrecy agreements with the resin supplier, equipment manufacturer, or another third party? If so, please indicate the resins, resin supplier, or equipment manufacturer and the relevant agreement.

No

SIGN NAMES IN FULL - DATE ALL SIGNATURES

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This disclosure of invention has been read and thoroughly understood by me.

Immediate Supervisor	Date	Director, Dept. Head or Vice Pres.	Date
Printed Full Name:		Ronald Cotterman	[redacted]
Signature:		Ronald Cotterman	

For more than 4 inventors, please copy this page and attach it with additional inventor information, signatures and dates: